

Survey Results & Analysis

for

Software Reuse Questionnaire 2

Account: seeds

Monday, July 25, 2005 2:17:42 PM

Vista™ Survey System

Introduction

This report contains a detailed statistical analysis of the results to your survey named *Software Reuse Questionnaire* 2. The results analysis includes answers from all respondents who took your survey in the 146 day period from Wednesday, March 02, 2005 to Monday, July 25, 2005 inclusive.

Report Contents

This report is divided into four sections:

- 1. Introduction
- 2. Results Analysis
- 3. Questionnaire
- 4. Notes

The **Introduction** (this section) contains an overview of the report structure.

The **Results Analysis** section contains a summary and statistical analysis of the results to each question in your survey.

The **Questionnaire** section lists all questions in your survey's questionnaire. This is provided as a reference to help you interpret the Results Analysis.

The **Notes** sections contains definitions of key terms and tips on how to interpret your results.

Confidence Intervals

Wherever possible, results are presented with an indication of the results accuracy. Usually this is presented in the form of a confidence interval. It is important when reviewing survey results to make sure that any action you plan is based only on statistically significant results.

Correlation Analysis

In preparing the results analysis, the report generator has examined all questions in pairs to see if there are any correlations between answers. Whenever a significant correlation is found, it is noted. This information can be valuable in determining what demographic or experience characteristics tend to drive key measures such as overall satisfaction.

Results Analysis

Survey name: Software Reuse Questionnaire 2
Start date: Wednesday, March 02, 2005
End date: Monday, July 25, 2005

Number of respondents: 100

Filter:

i)

Include all respondent's answers.

Earth Science Software Reuse Questionnaire

This software reuse questionnaire is being conducted by the NASA Earth Science Data Systems Software Reuse Working Group to (1) learn about the Earth science community's needs for reusable software components (and other software development artifacts), (2) identify software artifacts that are already being reused within the community, and (3) identify existing patterns of software reuse.

Your participation in this survey is appreciated as it will help us to better understand the reuse needs of the Earth science community and to propose solutions that can best fit those needs. Such solutions will enable members of the community to more easily share, publish and locate reusable components of interest. By facilitating reuse within the Earth science community, the working group is seeking to help you reduce system development costs, gain greater visibility for your work within the community, and more efficiently share resources across projects.

On average, the questionnaire takes about 20 minutes to complete. In addition to submitting your own response, it would be valuable to the reuse working group if you can also forward the questionnaire to other members of your development team who are involved in system architecture and/or influence decisions on selection of system components.

The information collected here will only be used by the reuse working group for the purposes described above. Individual responses will not be distributed to other entities without prior approval from respondents. Results will only be published in aggregate form and will be made available at http://softwarereuse.nasa.gov/

The NASA Earth Science Data Systems Software Reuse Working Group is chartered to address technical issues required to enable and facilitate reuse of software assets within the Earth science community. The working group is comprised of part time support staff from NASA, Earth science mission projects, Earth science data providers and university researchers. More information about the activities of the working group can be found at http://softwarereuse.nasa.gov/. You can subscribe to our mailing list at here.

1) Which of the following best describes your main role in your project/software development process? (Select one)

| Principal Investigator | (17) 17.0% | |
|------------------------------------|--|-----|
| Scientist | (17) 17.0% | |
| Technical/Project Manager | (19) 19.0% | |
| System Architect/Designer/Engineer | (24) 24.0% | |
| Software Engineer/Developer | (13) 13.0% | |
| Other | (10) 10.0% | |
| Total | (100) 0 10 20 30 40 50 60 70 80 90 100 | 196 |

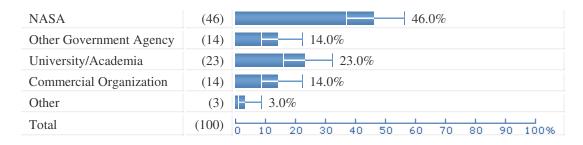
Confidence: +/-8.4%

1a) If Other, please specify:

Answers not displayed.

An answer to this question is not required and 90 of 100 respondents chose not to answer.

2) Which category best describes the type of your organization? (Select one)



Confidence: +/-9.7%

2a) If Other or Other Government Agency, please specify:

Answers not displayed.

An answer to this question is not required and 89 of 100 respondents chose not to answer.

3) Which Operating System(s) do you currently use or plan to use in the future for your system development

activities? (check all appropriate boxes)

| Unix | (67) | 67.0% | | | | | |
|---------------------------------|-------|-----------------------------------|--|--|--|--|--|
| Windows | (49) | 49.0% | | | | | |
| Macintosh | (31) | 31.0% | | | | | |
| Linux | (73) | 73.0% | | | | | |
| IBM Mainframes (e.g. MVS, z/OS) | (3) | 3.0% | | | | | |
| Other | (6) | 6.0% | | | | | |
| Total | (100) | 0 10 20 30 40 50 60 70 80 90 100% | | | | | |

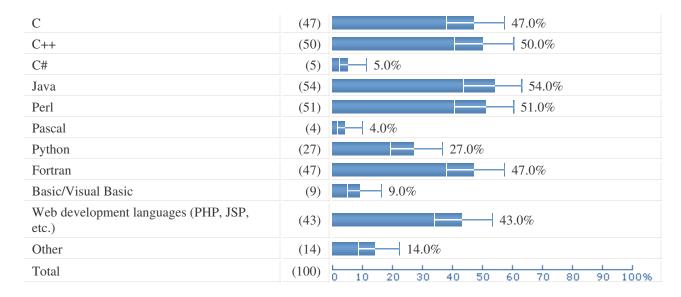
Confidence: +/-9.7%

3a) If Other, please specify:

Answers not displayed.

An answer to this question is not required and 93 of 100 respondents chose not to answer.

4) Which programming language(s) do you currently use or plan to use in the future for your system development activities? (check all appropriate boxes)



Confidence: +/-9.7%

An answer to this question is not required and 81 of 100 respondents chose not to answer.

- 5) Is your organization involved in activities that involve using either of the following:
- 5a) Federal Enterprise Architecture

| Not involved / Don't know | (89) | 89.0% |
|---|-------|-----------------------------------|
| Considering it | (8) | 8.0% |
| Currently involved / Plan to start in the near future | (5) | 5.0% |
| Total | (100) | 0 10 20 30 40 50 60 70 80 90 100% |

Confidence: +/-6.2%

5b) CMMI

iii)

| Not involved / Don't know | (68) | 68.0% |
|---|-------|-----------------------------------|
| Considering it | (9) | 9.0% |
| Currently involved / Plan to start in the near future | (23) | 23.0% |
| Total | (100) | 0 10 20 30 40 50 60 70 80 90 100% |

Confidence: +/-9.1%

Recent Reuse Experiences

Definition of Reuse: Within the context of this survey, reuse is defined as the process of creating systems using software development artifacts from existing systems, rather than building everything from scratch. Most reuse involves software source code but other types of software development artifacts (such as design patterns, algorithms, and executable components) can also be reused.

⁶⁾ Over the last five years, have you reused software development artifacts <u>developed outside of your project or group?</u>

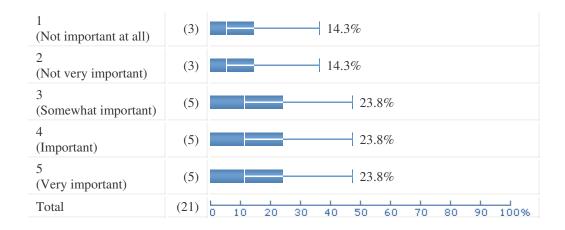
| Yes | (79) | | | | | | | | | | 79. | 0% |
|-------|-------|---|----|----|-----|------|----|----|----|----|-----|------|
| No | (21) | | | | _ 2 | 1.0% | | | | | | |
| Total | (100) | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

Confidence: +/-8.0%

Answers to this question are correlated with how respondents answered the following questions:

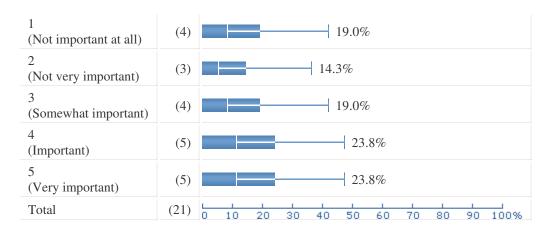
Correlation Question

- -0.31 Q53) May our researcher contact you if we need to clarify any of your responses?.
- iv) Go to question viii if question 6 is Yes
- v) Go to question vi if question 6 is No
- vi) Recent Reuse Experiences
- 7) How important were the following factors in preventing you from reusing software development artifacts developed outside of your group?
- 7a) a) I didn't know where to look for reusable artifacts



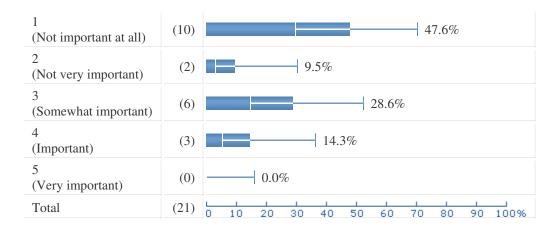
Confidence: +/-17.9%

7b) b) I didn't know that suitable reusable artifacts existed at the time



Confidence: +/-17.9%

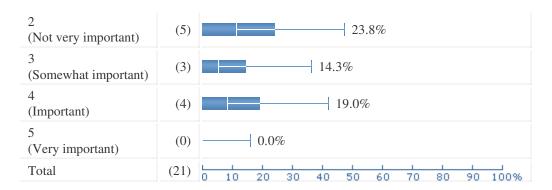
7c) c) I couldn't find anything that is compatible with my system



Confidence: +/-20.2%

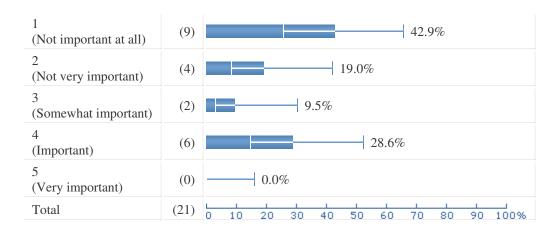
7d) d) Available artifacts were too complex or difficult to adapt to my needs





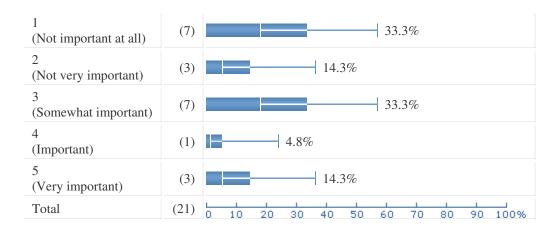
Confidence: +/-20.1%

7e) e) Available artifacts were difficult to understand or poorly documented



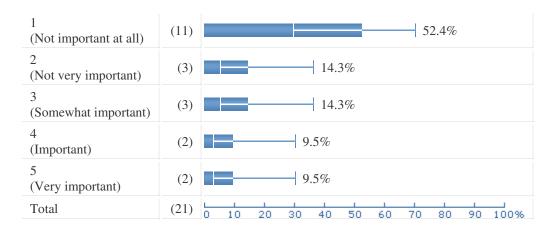
Confidence: +/-20.1%

7f) f) None of the available artifacts matched my requirements



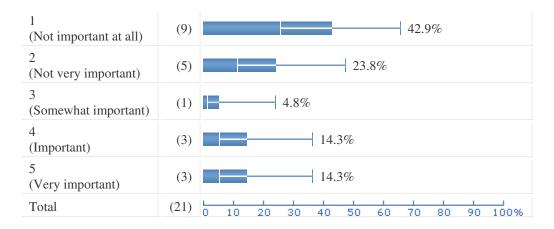
Confidence: +/-19.4%

7g) g) It was hard to overcome licensing restrictions



Confidence: +/-20.2%

7h) h) I needed the source code and it wasn't available



Confidence: +/-20.1%

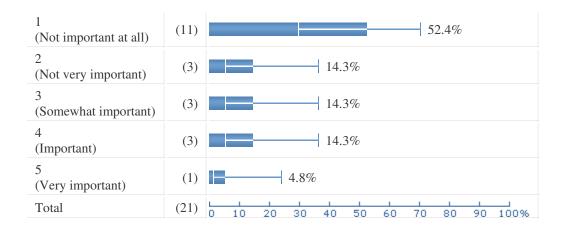
7i) i) I preferred to have the development take place within my project or wanted the experience of developing the needed capability



| 3 (Somewhat important) | (3) | 14.3% |
|------------------------|------|-----------------------------------|
| 4 (Important) | (2) | 9.5% |
| 5 (Very important) | (2) | 9.5% |
| Total | (21) | 0 10 20 30 40 50 60 70 80 90 100% |

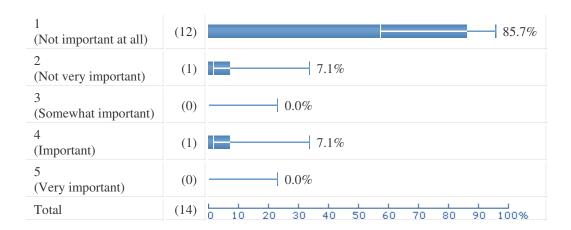
Confidence: +/-20.1%

7j) j) I didn't like how the other software was designed/implemented



Confidence: +/-20.2%

7k) k) Other



Confidence: +/-19.1%

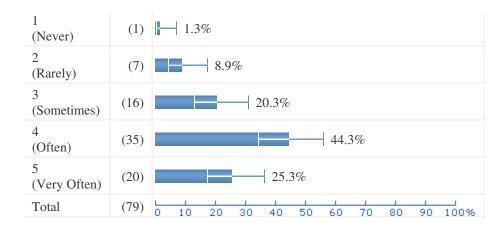
An answer to this question is not required and 7 of 21 respondents chose not to answer.

8) If Other, please specify what prevented you from reusing software development artifacts developed outside of your group:

Answers not displayed.

An answer to this question is not required and 16 of 21 respondents chose not to answer.

- vii) Go to question xix if question 6 is No
- viii) Recent Reuse Experiences
- 9) Over the last five years, how often have you (or your project) reused the following types of software development artifacts?
- 9a) a) Algorithms, Techniques

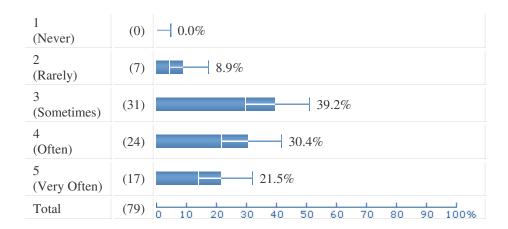


Confidence: +/-10.8%

| 1 (Never) | (13) 16.5% |
|-------------------|--|
| 2 (Rarely) | (14) 17.7% |
| 3 (Sometimes) | (19) 24.1% |
| 4 (Often) | 27.8% |
| 5 (Very Often) | (11) 13.9% |
| Total | (79) 0 10 20 30 40 50 60 70 80 90 100% |

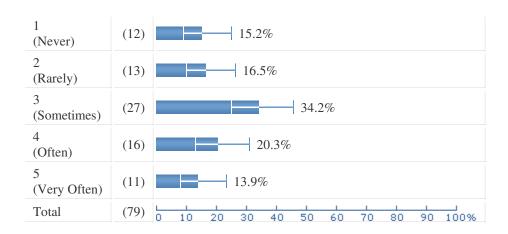
Confidence: +/-9.8%

9c) c) Source code, Scripts



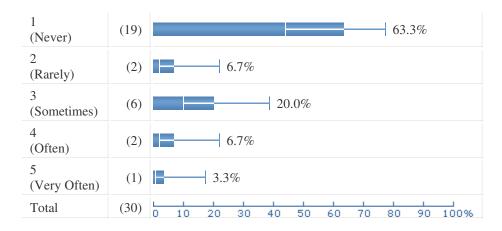
Confidence: +/-10.6%

9d) d) Executables, Binaries



Confidence: +/-10.4%

9e) e) Other



Confidence: +/-16.7%

An answer to this question is not required and 49 of 79 respondents chose not to answer.

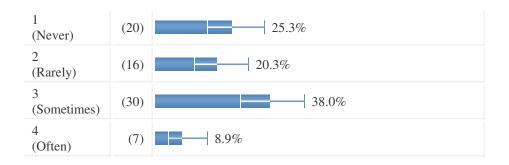
10) If Other, please specify what other types of software development artifacts you have reused in the last five years:

Answers not displayed.

An answer to this question is not required and 74 of 79 respondents chose not to answer.

11) Over the last five years, how often have you (or your project) reused the following types of software?

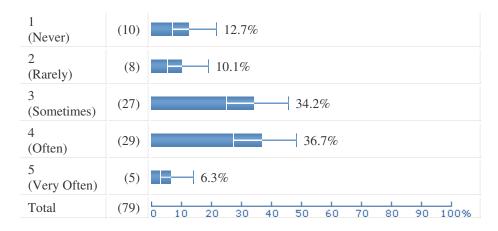
11a) a) Complete systems or applications



| 5 (Very Often) | (6) | - | | 7.69 | % | | | | | | | |
|-------------------|------|---|----|------|----|----|----|----|----|----|-----|------|
| T-4-1 | (70) | | | | 1 | | | | 1 | | - 1 | |
| Total | (79) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

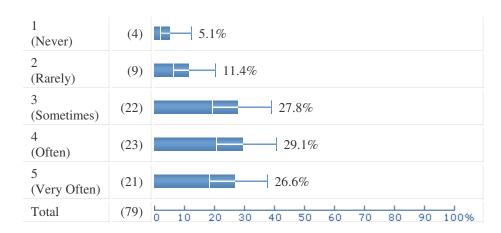
Confidence: +/-10.6%

11b) b) Subsystems or components

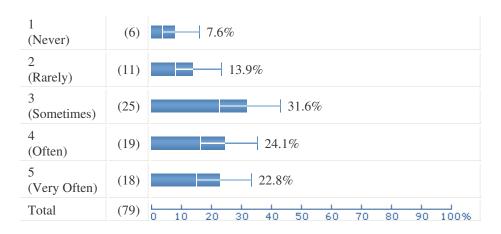


Confidence: +/-10.5%

11c) c) Code libraries

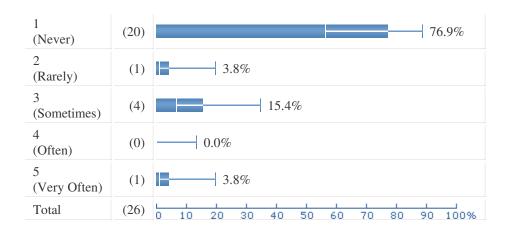


Confidence: +/-9.9%



Confidence: +/-10.2%

11e) e) Other



Confidence: +/-16.0%

An answer to this question is not required and 53 of 79 respondents chose not to answer.

12) If Other, please specify what other types of software you have reused in the last five years:

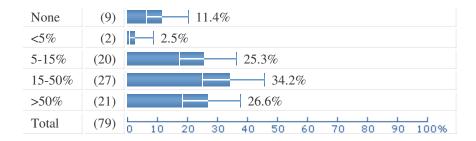
Answers not displayed.

An answer to this question is not required and 79 of 79 respondents chose not to answer.

ix) Recent Reuse Experiences

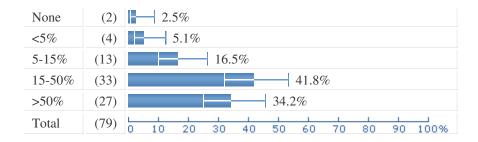
13) In your most recent software development experience, approximately what percentage of functionality was provided by each of the following (this is for your system only and excludes systems or services that your system interacts with)?

13a) a) Existing software in the baseline system



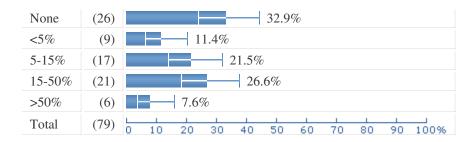
Confidence: +/-10.4%

13b) b) Newly written custom software



Confidence: +/-10.7%

13c) c) Software reused from another part of your organization



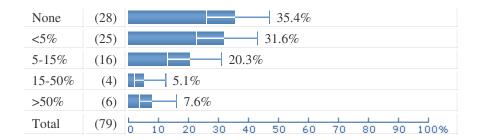
Confidence: +/-10.3%

13d) d) Software reused from another organization in the Earth science community

| None | (15) 19.0% |
|--------|--|
| <5% | (24) 30.4% |
| 5-15% | (24) 30.4% |
| 15-50% | (14) 17.7% |
| >50% | (2) 2.5% |
| Total | (79) 0 10 20 30 40 50 60 70 80 90 100% |

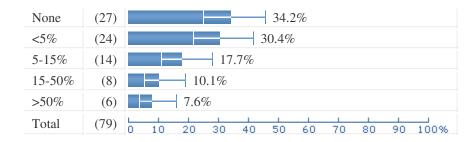
Confidence: +/-10.1%

13e) e) Software reused from outside the Earth science community



Confidence: +/-10.4%

13f) f) Commercial components



Confidence: +/-10.4%

13g) g) Other

| None | (25) | | | | | | 78.1% |
|--------|------|-------|-------|------|------|----|---------|
| <5% | (1) | 3.19 | 6 | | | | |
| 5-15% | (3) | | 9.4% | | | | |
| 15-50% | (2) | 6. | .2% | | | | |
| >50% | (1) | 3.19 | 6 | | | | |
| Total | (32) | 10 20 | 30 40 | 50 6 | 0 70 | 80 | 90 100% |

Confidence: +/-14.3%

An answer to this question is not required and 47 of 79 respondents chose not to answer.

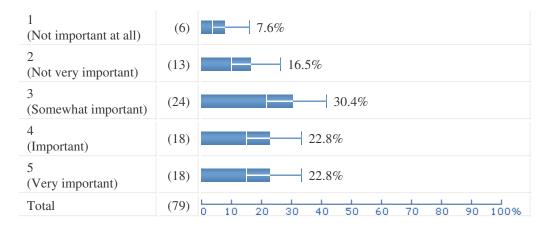
14) If Other, please specify the other sources of software that you've used in your most recent software development project:

Answers not displayed.

An answer to this question is not required and 75 of 79 respondents chose not to answer.

15) If you've indicated that you've reused software <u>from outside of your project group</u>, how important were the following factors in your decision to consider reuse?

15a) a) Saving money

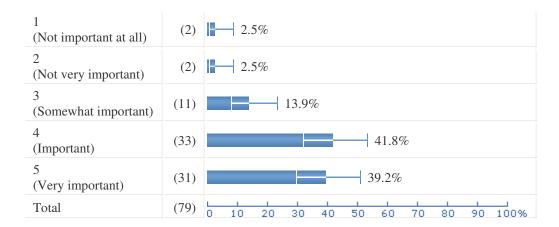


Confidence: +/-10.1%

| 1 (Not important at all) | (0) | 0.0% |
|--------------------------|------|-----------------------------------|
| 2 (Not very important) | (1) | ⊩ 1.3% |
| 3 (Somewhat important) | (9) | 11.4% |
| 4 (Important) | (28) | 35.4% |
| 5 (Very important) | (41) | 51.9% |
| Total | (79) | 0 10 20 30 40 50 60 70 80 90 100% |

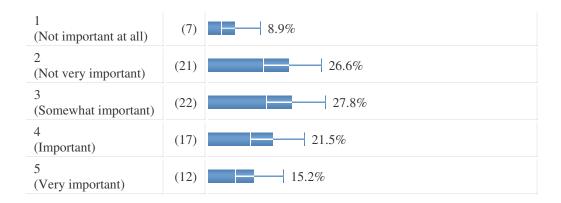
Confidence: +/-10.9%

15c) c) Ensuring reliability



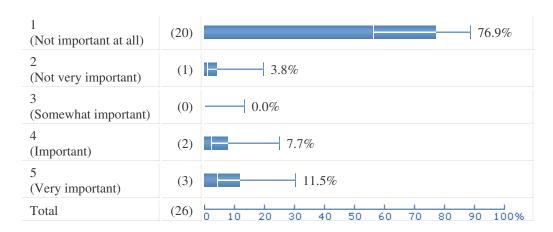
Confidence: +/-10.7%

15d) d) Not having the needed expertise in my organization



Confidence: +/-9.8%

15e) e) Other



Confidence: +/-16.0%

An answer to this question is not required and 53 of 79 respondents chose not to answer.

16) If Other, please specify how you provided the specified percentage of functionality in your most recent software development project:

Answers not displayed.

An answer to this question is not required and 75 of 79 respondents chose not to answer.

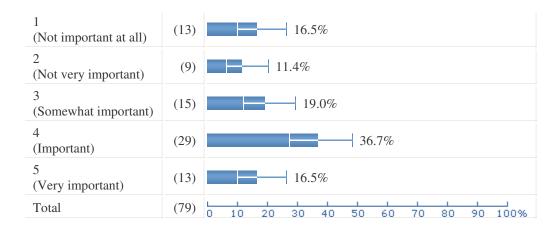
x) Recent Reuse Experiences

17) For any of the newly written software, was there software from another source that might have provided *any* of the capabilities needed? If so, how important were the following factors in preventing you from reusing that software?

| 1 (Not important at all) | (22) | 27.8% |
|--------------------------|------|-----------------------------------|
| 2 (Not very important) | (9) | 11.4% |
| 3 (Somewhat important) | (19) | 24.1% |
| 4 (Important) | (22) | 27.8% |
| 5 (Very important) | (7) | 8.9% |
| Total | (79) | 0 10 20 30 40 50 60 70 80 90 100% |

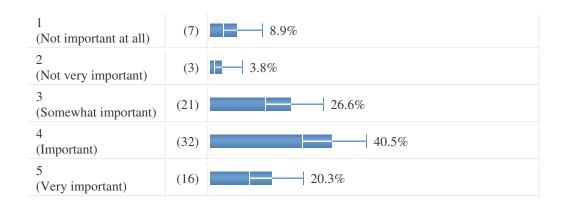
Confidence: +/-9.8%

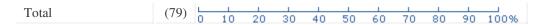
17b) b) Other software wasn't compatible with my system



Confidence: +/-10.5%

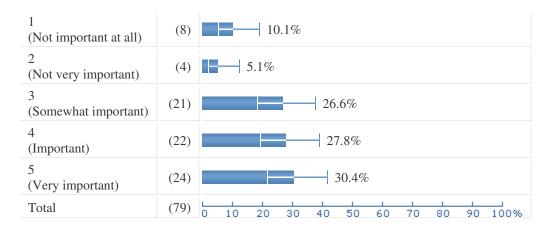
17c) c) Other software didn't exactly match my requirements





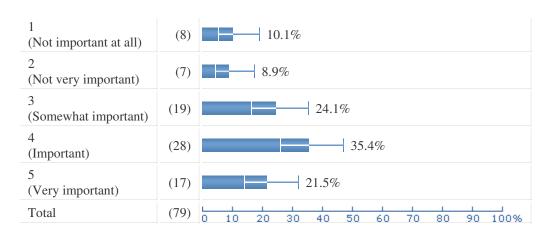
Confidence: +/-10.7%

17d) d) Other software was difficult to understand or poorly documented



Confidence: +/-10.1%

17e) e) Other software was too complex or difficult to adapt to my needs



Confidence: +/-10.4%

17f) f) It was hard to overcome licensing restrictions

| (Not important at all) | | |
|------------------------|-------------------------------------|------|
| 2 (Not very important) | (15) 19.0% | |
| 3 (Somewhat important) | (12) 15.2% | |
| 4 (Important) | (12) 15.2% | |
| 5 (Very important) | (15) 19.0% | |
| Total | (79) 0 10 20 30 40 50 60 70 80 90 1 | .00% |

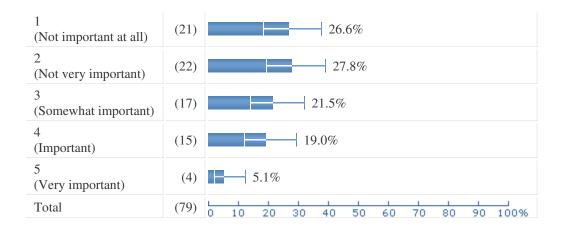
Confidence: +/-10.2%

17g) g) I needed the source code and it wasn't available



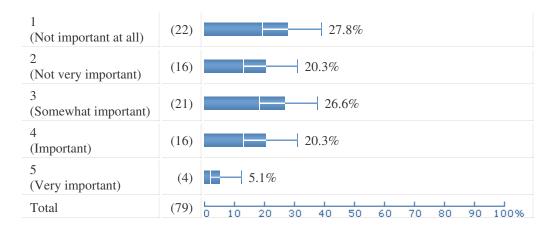
Confidence: +/-9.2%

17h) h) I preferred to have the development take place within my project or wanted the experience of developing the needed capability



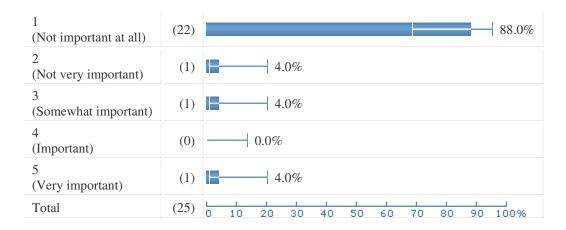
Confidence: +/-9.8%

17i) i) I didn't like how the other software was designed/implemented



Confidence: +/-9.8%

17j) j) Other



Confidence: +/-13.3%

An answer to this question is not required and 54 of 79 respondents chose not to answer.

18) If Other, please specify what other factors prevented you from reusing existing software:

An answer to this question is not required and 78 of 79 respondents chose not to answer.

xi) Recent Reuse Experiences

19) The Software Reuse Working Group is very interested in identifying some of the artifacts that have been successfully reused by the community. Please help us by listing a few of the artifacts that you have reused over the last five years.

19a) Name of Artifact:

Answers not displayed.

An answer to this question is not required and 14 of 79 respondents chose not to answer.

19b) Source Organization of Artifact:

Answers not displayed.

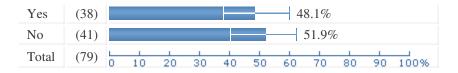
An answer to this question is not required and 21 of 79 respondents chose not to answer.

19c) Reference or URL of Artifact:

Answers not displayed.

An answer to this question is not required and 36 of 79 respondents chose not to answer.

20) Another Artifact?



Confidence: +/-10.9%

xii) Recent Reuse Experiences

This question is asked if the answer to question 20 is Yes.

21) Any information about this artifact will be appreciated.

This question is asked if the answer to question 20 is Yes.

21a) Name of Artifact:

Answers not displayed.

This question is asked if the answer to question 20 is Yes.

An answer to this question is not required and 1 of 38 respondents chose not to answer.

21b) Source Organization of Artifact:

Answers not displayed.

This question is asked if the answer to question 20 is Yes.

An answer to this question is not required and 7 of 38 respondents chose not to answer.

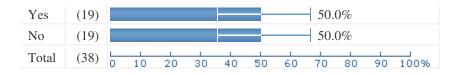
21c) Reference or URL of Artifact:

Answers not displayed.

This question is asked if the answer to question 20 is Yes.

An answer to this question is not required and 11 of 38 respondents chose not to answer.

22) Another Artifact?



Confidence: +/-15.4%

This question is asked if the answer to question 20 is Yes.

xiii) Recent Reuse Experiences

This question is asked if the answer to question 22 is Yes.

23) Any information about this artifact will be appreciated.

This question is asked if the answer to question 22 is Yes.

23a) Name of Artifact:

Answers not displayed.

This question is asked if the answer to question 22 is Yes.

An answer to this question is not required and 2 of 19 respondents chose not to answer.

23b) Source Organization of Artifact:

Answers not displayed.

This question is asked if the answer to question 22 is Yes.

An answer to this question is not required and 7 of 19 respondents chose not to answer.

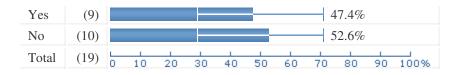
23c) Reference or URL of Artifact:

Answers not displayed.

This question is asked if the answer to question 22 is Yes.

An answer to this question is not required and 7 of 19 respondents chose not to answer.

24) Another Artifact?



Confidence: +/-21.1%

This question is asked if the answer to question 22 is Yes.

xiv) Recent Reuse Experiences

This question is asked if the answer to question 24 is Yes.

25) Any information about this artifact will be appreciated.

This question is asked if the answer to question 24 is Yes.

25a) Name of Artifact:

Answers not displayed.

This question is asked if the answer to question 24 is Yes.

An answer to this question is not required and 0 of 9 respondents chose not to answer.

25b) Source Organization of Artifact:

Answers not displayed.

This question is asked if the answer to question 24 is Yes.

An answer to this question is not required and 2 of 9 respondents chose not to answer.

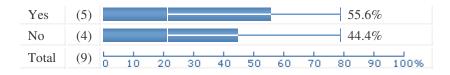
25c) Reference or URL of Artifact:

Answers not displayed.

This question is asked if the answer to question 24 is Yes.

An answer to this question is not required and 2 of 9 respondents chose not to answer.

26) Another Artifact?



Confidence: +/-28.8%

This question is asked if the answer to question 24 is Yes.

This question is asked if the answer to question 26 is Yes. 27) Any information about this artifact will be appreciated. This question is asked if the answer to question 26 is Yes. 27a) Name of Artifact: Answers not displayed. This question is asked if the answer to question 26 is Yes. An answer to this question is not required and 0 of 5 respondents chose not to answer. 27b) Source Organization of Artifact: Answers not displayed. This question is asked if the answer to question 26 is Yes. An answer to this question is not required and 0 of 5 respondents chose not to answer. 27c) Reference or URL of Artifact: Answers not displayed. This question is asked if the answer to question 26 is Yes. An answer to this question is not required and 0 of 5 respondents chose not to answer. **xvi)** Recent Reuse Experiences 28) How effective were the following in helping you locate and acquire software development artifacts?

xv)

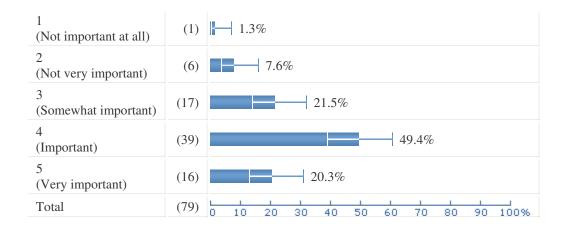
Recent Reuse Experiences

28a) a) Personal knowledge from past projects

| 1 (Not important at all) | (0) | ─ 0.0% |
|--------------------------|------|-----------------------------------|
| 2 (Not very important) | (3) | 3.8% |
| 3 (Somewhat important) | (16) | 20.3% |
| 4 (Important) | (34) | 43.0% |
| 5 (Very important) | (26) | 32.9% |
| Total | (79) | 0 10 20 30 40 50 60 70 80 90 100% |

Confidence: +/-10.8%

28b) b) Word of mouth/networking



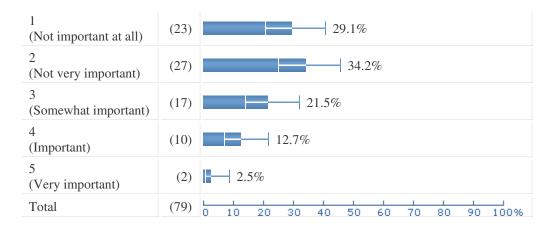
Confidence: +/-10.9%

28c) c) Google search or similar



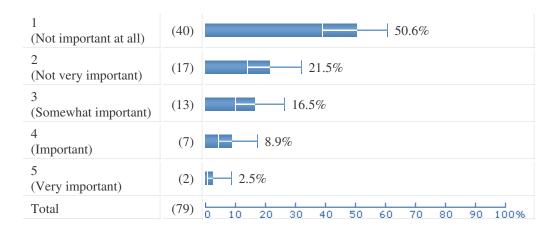
Confidence: +/-9.8%

28d) d) Serendipity



Confidence: +/-10.4%

28e) e) Reuse catalog or repository



Confidence: +/-10.9%

29) Please list the catalogs or repositories you have used:

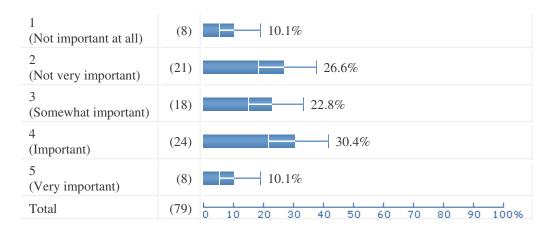
Answers not displayed.

An answer to this question is not required and 67 of 79 respondents chose not to answer.

xvii) Recent Reuse Experiences

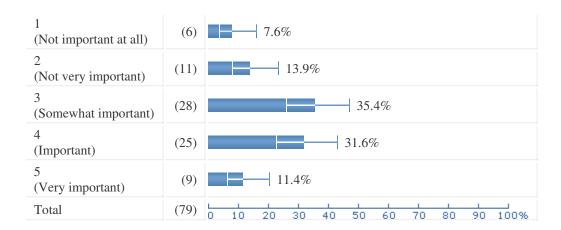
30) When evaluating software development artifacts for reuse, how important are the following factors in influencing your decision to reuse an artifact?

30a) a) Knowledge of author



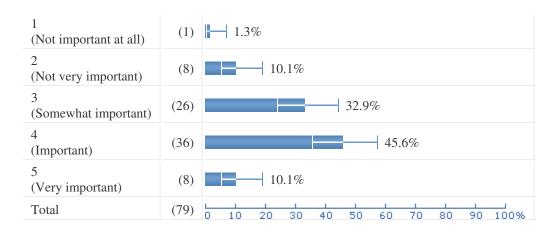
Confidence: +/-10.1%

30b) b) Testing/certification



Confidence: +/-10.4%

30c) c) Recommendation from colleague



Confidence: +/-10.8%

30d) d) Standards compliance



Confidence: +/-10.8%

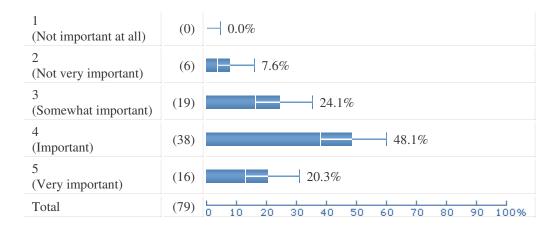
30e) e) Availability of source code

| 1 (Not important at all) | (2) | 2.5% |
|--------------------------|-----|------|
| 2 (Not very important) | (4) | 5.1% |

| 3 (Somewhat important) | (12) | 15.2% |
|------------------------|------|-----------------------------------|
| 4 (Important) | (32) | 40.5% |
| 5 (Very important) | (29) | 36.7% |
| Total | (79) | 0 10 20 30 40 50 60 70 80 90 100% |

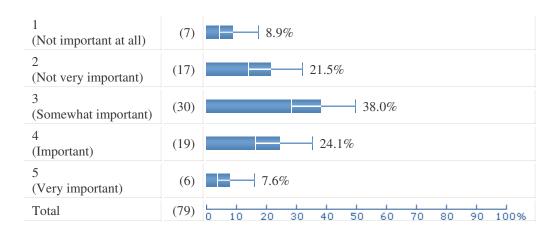
Confidence: +/-10.7%

30f) f) Quality of documentation



Confidence: +/-10.9%

30g) g) Availability of support/maintenance



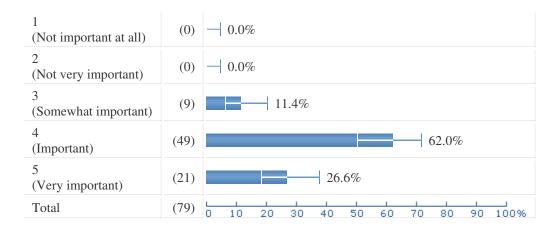
Confidence: +/-10.6%

30h) h) Low dependency on other artifacts

| 1 (Not important at all) | (3) | 3.8% |
|--------------------------|------|-----------------------------------|
| 2 (Not very important) | (6) | 7.6% |
| 3 (Somewhat important) | (31) | 39.2% |
| 4 (Important) | (28) | 35.4% |
| 5 (Very important) | (11) | 13.9% |
| Total | (79) | 0 10 20 30 40 50 60 70 80 90 100% |

Confidence: +/-10.6%

30i) i) Ease of adaptation/integration



Confidence: +/-10.6%

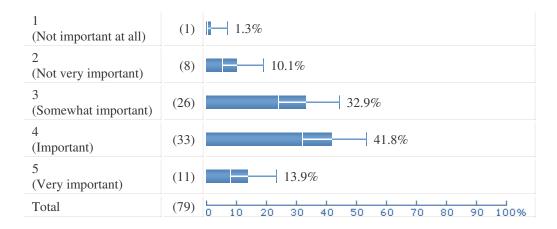
30j) j) Cost of creating/acquiring alternative

| 1 (Not important at all) | (0) | ─ 0.0% |
|--------------------------|------|--------|
| 2 (Not very important) | (4) | 5.1% |
| 3 (Somewhat important) | (21) | 26.6% |

| 4 (Important) | (29) | | | | - | | → 36 | 5.7% | | | | |
|--------------------|------|---|----|----|----|----|-------|------|----|----|----|------|
| 5 (Very important) | (25) | | _ | _ | | | 31.69 | % | | | | |
| Total | (79) | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

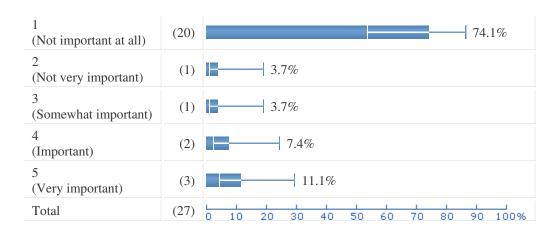
Confidence: +/-10.5%

30k) k) Complexity of functionality



Confidence: +/-10.7%

301) 1) Other



Confidence: +/-16.3%

An answer to this question is not required and 52 of 79 respondents chose not to answer.

31) If other, please specify any other factors that have influenced your decision to use an artifact in the past:

Answers not displayed.

An answer to this question is not required and 73 of 79 respondents chose not to answer.

xviii) Recent Reuse Experiences

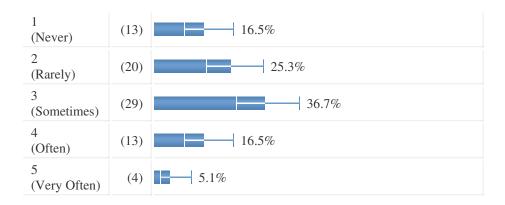
32) For software development artifacts that you've reused in the last five years, how often have you

32a) a) Modified the artifacts?



Confidence: +/-10.8%

32b) b) Communicated the changes back to the original developer(s) of those artifacts

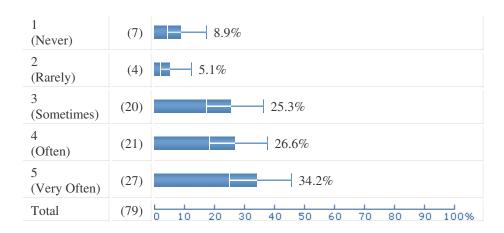




Confidence: +/-10.5%

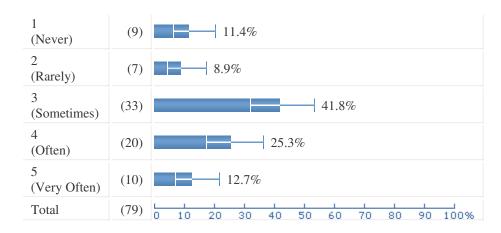
33) Now thinking about licensing for reuse: for software development artifacts that you've reused in the last five years, how often have you

33a) a) Used open source software?



Confidence: +/-10.4%

33b) b) Used a shareware/public domain software?



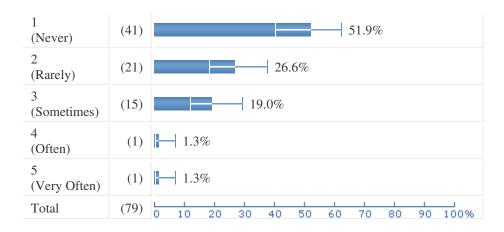
Confidence: +/-10.7%

33c) c) Used a formal license agreement with the artifact developer?

| 1 (Never) | (34) 43.0% | |
|-------------------|---------------------------------------|----|
| 2 (Rarely) | (17) 21.5% | |
| 3 (Sometimes) | (18) 22.8% | |
| 4 (Often) | (7) 8.9% | |
| 5 (Very Often) | (3) 3.8% | |
| Total | (79) 0 10 20 30 40 50 60 70 80 90 100 | 96 |

Confidence: +/-10.8%

33d) d) Used a semi-formal agreement (e.g. Memorandum of Understanding) with the artifact developer?



Confidence: +/-10.9%

33e) e) Reused the artifacts without a formal license?

| 1 (Never) | (30) | 38.0% |
|---------------|------|-------|
| 2 (Rarely) | (14) | 17.7% |
| 3 (Sometimes) | (19) | 24.1% |

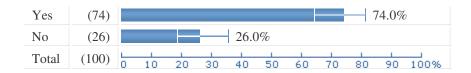


Confidence: +/-10.6%

xix) Reusability

Definition of Reusability: Reusability is the ability of a software development artifact to be reused, in whole or in part, in new systems.

34) Over the last five years, have you made any of your software development artifacts available for people outside of your project or group?



Confidence: +/-8.6%

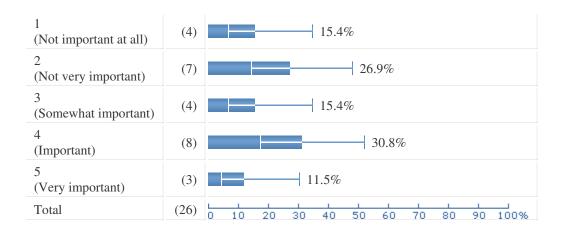
xx) Go to question xxii if question 34 is No

xxi) Go to question xxiv if question 34 is Yes

xxii) Reusability

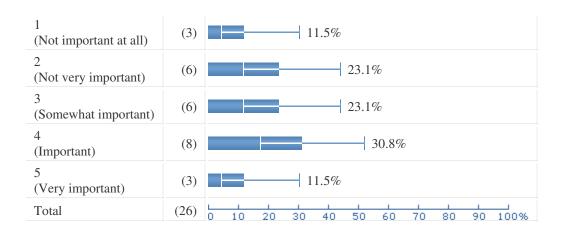
available for reuse?

35a) a) Not knowing how



Confidence: +/-17.3%

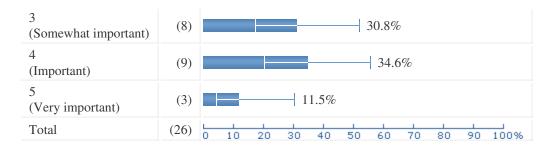
35b) b) Cost of developing for reuse



Confidence: +/-17.3%

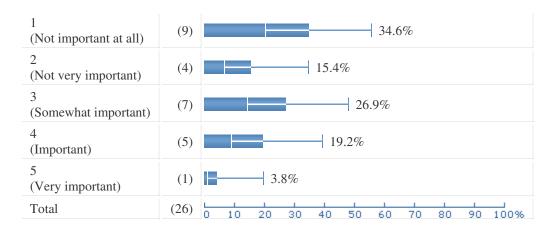
35c) c) Not knowing if it will be useful





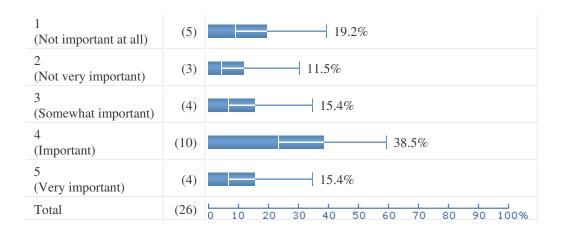
Confidence: +/-17.7%

35d) d) Your organization's software release policy limitations



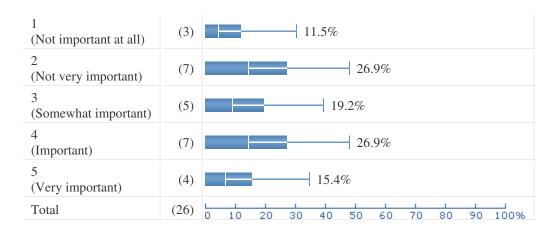
Confidence: +/-17.7%

35e) e) Support and maintenance



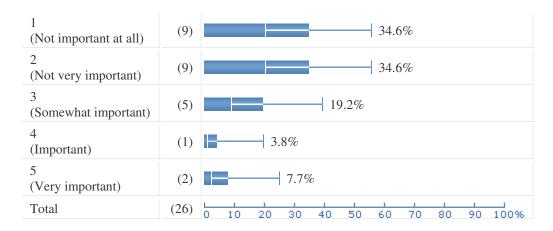
Confidence: +/-18.0%

35f) f) No standard way for distribution



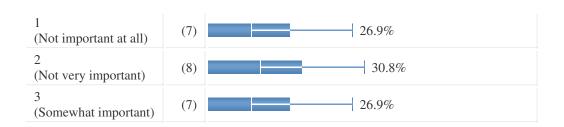
Confidence: +/-16.7%

35g) g) Concern over losing competitive advantage



Confidence: +/-17.7%

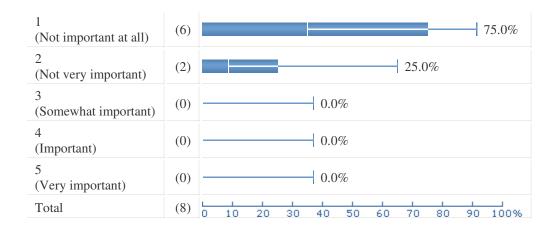
35h) h) Concern over losing intellectual property



| 4 (Important) | (2) | - | | | 7.79 | 6 | | | | | | |
|--------------------|------|---|----|----|------|----|----|----|----|----|----|------|
| 5 (Very important) | (2) | | | | 7.79 | 6 | | | | | | |
| Total | (26) | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

Confidence: +/-17.3%

35i) i) Other



Confidence: +/-28.3%

An answer to this question is not required and 18 of 26 respondents chose not to answer.

36) If Other, please specify what prevented you from making your software development artifacts available for reuse outside of your group:

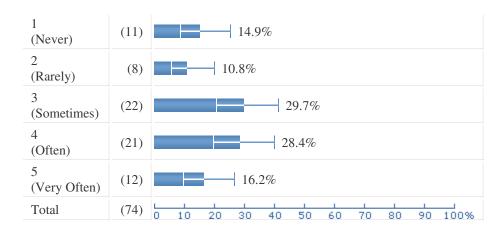
Answers not displayed.

An answer to this question is not required and 25 of 26 respondents chose not to answer.

xxiii)Go to question xxviii if question 34 is No

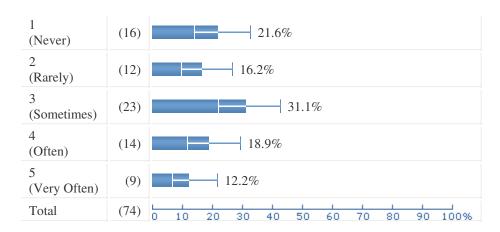
37) How often have you built the following types of software development artifacts in a way that they can be more readily reused outside of your project?

37a) a) Algorithms, Techniques



Confidence: +/-10.3%

37b) b) Designs, Architectures

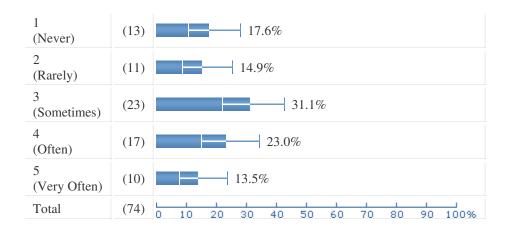


Confidence: +/-10.5%

| 1 (Never) | (5) | 6.8% |
|-------------------|------|-----------------------------------|
| 2 (Rarely) | (5) | 6.8% |
| 3 (Sometimes) | (20) | 27.0% |
| 4 (Often) | (29) | 39.2% |
| 5 (Very Often) | (15) | 20.3% |
| Total | (74) | 0 10 20 30 40 50 60 70 80 90 100% |

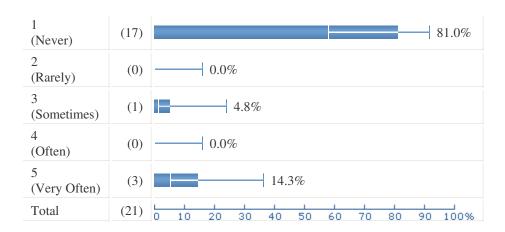
Confidence: +/-11.0%

37d) d) Executables, Binaries



Confidence: +/-10.5%

37e) e) Other



Confidence: +/-16.8%

An answer to this question is not required and 53 of 74 respondents chose not to answer.

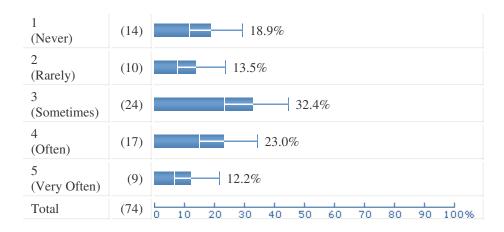
38) If Other, please specify what other types of software development artifacts you have built in a way that they can be readily reused outside of your project:

Answers not displayed.

An answer to this question is not required and 73 of 74 respondents chose not to answer.

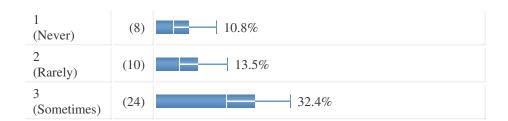
39) How often have you developed the following types of software in a way that they can be more readily reused outside of your project?

39a) a) Complete solutions or applications



Confidence: +/-10.6%

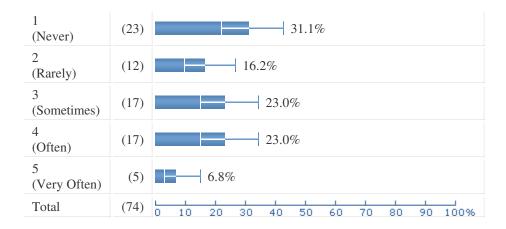
39b) b) Subsystems or components



| 4 (Often) | (24) | | | - | | | 32.4 | % | | | | |
|-------------------|------|---|----|----|------|----|------|----|----|----|----|------|
| 5 (Very Often) | (8) | | | 10 | 0.8% | | | | | | | |
| Total | (74) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

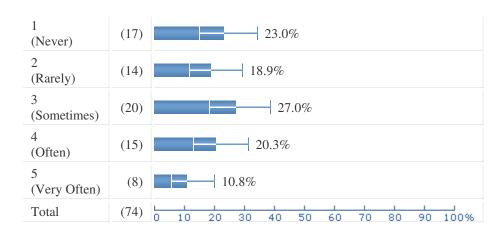
Confidence: +/-10.6%

39c) c) Code libraries

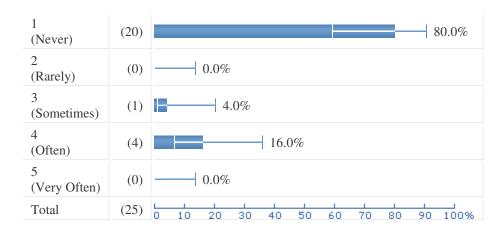


Confidence: +/-10.5%

39d) d) Code fragments



Confidence: +/-10.1%



Confidence: +/-15.7%

An answer to this question is not required and 49 of 74 respondents chose not to answer.

40) If Other, please specify what other types of software you have developed in a way that they can be readily reused outside of your project:

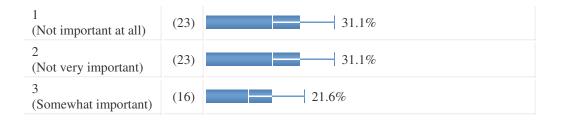
Answers not displayed.

An answer to this question is not required and 72 of 74 respondents chose not to answer.

xxv) Reusability

41) How important were the following factors in preventing you from making your artifacts available for reuse?

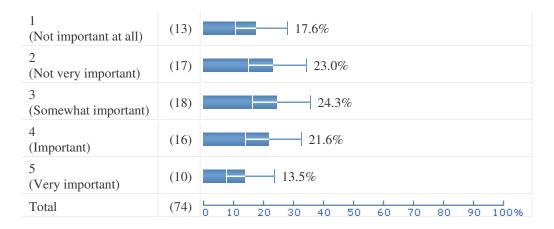
41a) a) Not knowing how



| 4 (Important) | (7) | | | ⊢ 9.5 | 5% | | | | | | | |
|--------------------|------|---|----|--------------|----|----|----|----|----|----|----|------|
| 5 (Very important) | (5) | | | 6.8% | 6 | | | | | | | |
| Total | (74) | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

Confidence: +/-10.5%

41b) b) Cost of developing for reuse



Confidence: +/-9.7%

41c) c) Not knowing if it will be useful



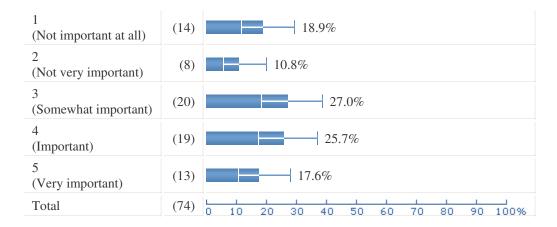
Confidence: +/-10.5%

41d) d) Your organization's software release policy limitations

| 1 (Not important at all) | (25) | 33.8% |
|--------------------------|------|-----------------------------------|
| 2 (Not very important) | (17) | 23.0% |
| 3 (Somewhat important) | (8) | 10.8% |
| 4 (Important) | (9) | 12.2% |
| 5 (Very important) | (15) | 20.3% |
| Total | (74) | 0 10 20 30 40 50 60 70 80 90 100% |

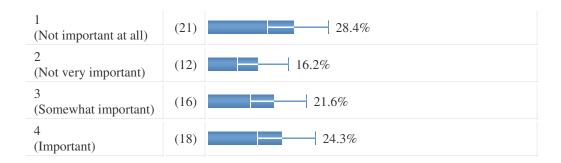
Confidence: +/-10.7%

41e) e) Support and maintenance



Confidence: +/-10.1%

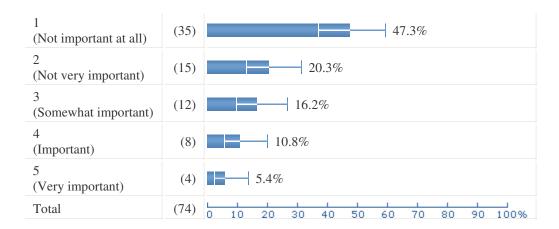
41f) f) No standard way for distribution



| 5 (Very important) | (7) | | | ⊢ 9.5 | 5% | | | | | | | |
|--------------------|-------|---|----|--------------|----|----|----|----|----|----|-----|------|
| T-4-1 | (7.4) | | 1 | - 1 | | 1 | | | | | - 1 | |
| Total | (74) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

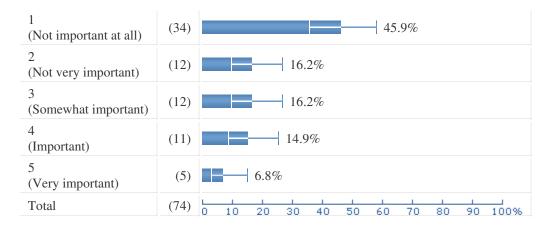
Confidence: +/-10.2%

41g) g) Concern over losing competitive advantage

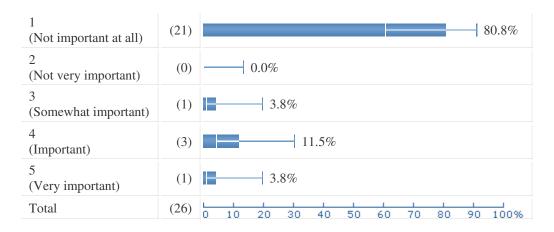


Confidence: +/-11.2%

41h) h) Concern over losing intellectual property



Confidence: +/-11.2%



Confidence: +/-15.2%

An answer to this question is not required and 48 of 74 respondents chose not to answer.

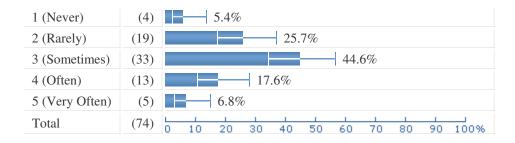
42) If Other, please specify any other factors that have prevented you from making your artifacts available for reuse:

Answers not displayed.

An answer to this question is not required and 70 of 74 respondents chose not to answer.

xxvi) Reusability

43) To your knowledge, how often are the software development artifacts produced by your project reused by others?



Confidence: +/-11.2%

successfully reused within the Earth science community. Please help us by listing a few of the reusable artifacts that you provided over the last five years

44a) Name of Artifact:

Answers not displayed.

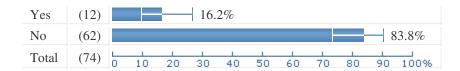
An answer to this question is not required and 21 of 74 respondents chose not to answer.

44b) Reference or URL of Artifact:

Answers not displayed.

An answer to this question is not required and 37 of 74 respondents chose not to answer.

45) Another Artifact?



Confidence: +/-8.5%

xxvii) Reusability

This question is asked if the answer to question 45 is Yes.

46) Any information about this artifact will be appreciated.

This question is asked if the answer to question 45 is Yes.

46a) Name of Artifact:

Answers not displayed.

This question is asked if the answer to question 45 is Yes.

An answer to this question is not required and 0 of 12 respondents chose not to answer.

46b) Reference or URL of Artifact:

Answers not displayed.

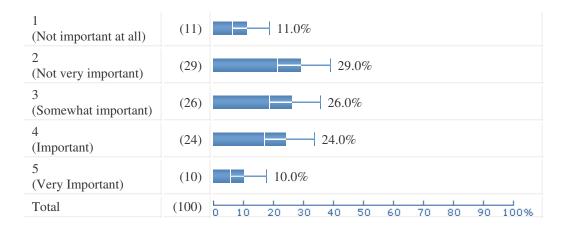
This question is asked if the answer to question 45 is Yes.

An answer to this question is not required and 0 of 12 respondents chose not to answer.

xxviii) Community Needs

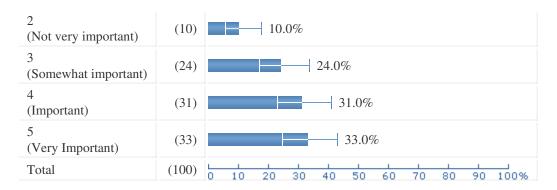
47) In your opinion, how important would the following factors be in helping increase the level of reuse within Earth science community?

47a) a) Standardized license agreement for the Earth science community



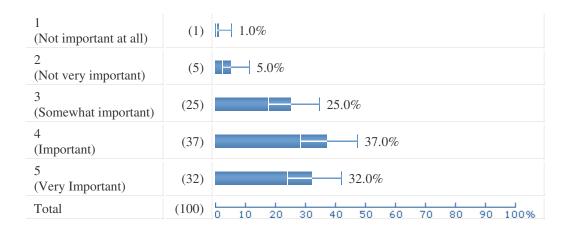
Confidence: +/-8.8%

47b) b) Use of open source licensing



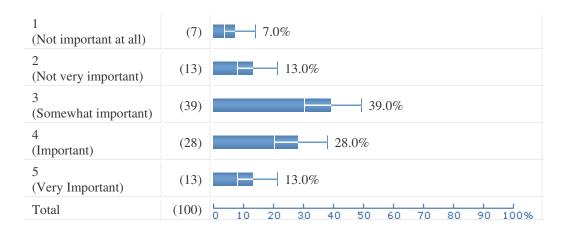
Confidence: +/-9.2%

47c) c) An Earth science catalog/repository for reusable artifacts



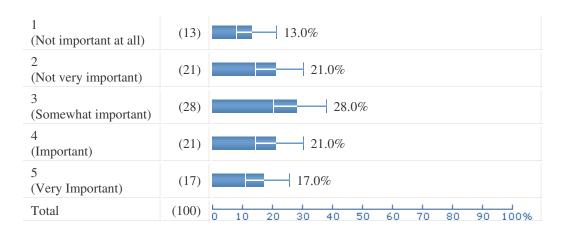
Confidence: +/-9.4%

47d) d) Standardized support policy for reused software



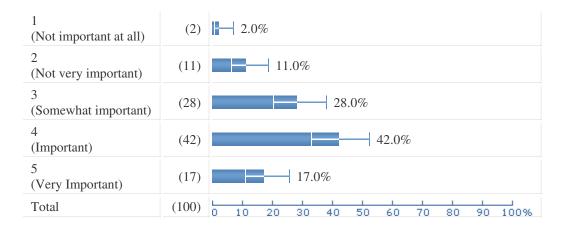
Confidence: +/-9.5%

47e) e) Changes to NASA external release policy



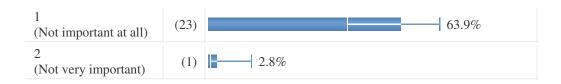
Confidence: +/-8.8%

47f) f) Education/guidance on reuse



Confidence: +/-9.6%

47g) g) Other



| 3 (Somewhat important) | (4) | 11.1% |
|------------------------|------|-----------------------------------|
| 4 (Important) | (1) | 2.8% |
| 5 (Very Important) | (7) | 19.4% |
| Total | (36) | 0 10 20 30 40 50 60 70 80 90 100% |

Confidence: +/-15.3%

An answer to this question is not required and 64 of 100 respondents chose not to answer.

48) If Other, please specify what other factors you think are important in helping increase the level of reuse within the Earth science community:

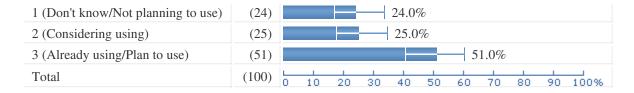
Answers not displayed.

An answer to this question is not required and 87 of 100 respondents chose not to answer.

xxix) Community Needs

49) Which of the following are you considering as part of your future software development efforts?

49a) a) Web services



Confidence: +/-9.7%

49b) b) Component-based architectures

| 2 (Considering using) | (20) | | | | — 20 | 0.0% | | | | | | |
|-------------------------------|-------|---|----|----|---------------|------|----|-------|----|----|----|------|
| 3 (Already using/Plan to use) | (41) | | | | | | | 11.0% | | | | |
| Total | (100) | 6 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

Confidence: +/-9.6%

49c) c) Commercial components

| 1 (Don't know/Not planning to use) | (51) | | | | | | — 5 | 1.0% | | | |
|------------------------------------|-------|----|----|----|------------------|----|------------|------|----|----|------|
| 2 (Considering using) | (27) | | | | - 27. | 0% | | | | | |
| 3 (Already using/Plan to use) | (22) | | | | 22.0% |) | | | | | |
| Total | (100) | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

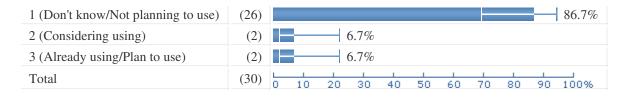
Confidence: +/-9.7%

49d) d) Grid services

| 1 (Don't know/Not planning to use) | (58) | | | | | | | | 58. | 0% | | |
|------------------------------------|-------|---|----|-----|----|----|-------|----|-----|----|----|------|
| 2 (Considering using) | (33) | | | | | | 33.09 | 6 | | | | |
| 3 (Already using/Plan to use) | (9) | | | 9.0 | % | | | | | | | |
| Total | (100) | 5 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100% |

Confidence: +/-9.6%

49e) g) Other



Confidence: +/-12.5%

An answer to this question is not required and 70 of 100 respondents chose not to answer.

software development efforts:

Answers not displayed.

An answer to this question is not required and 97 of 100 respondents chose not to answer.

51) Which reusable artifacts would you use if those were made available? (feel free to specify specific artifacts that you would like to reuse, or types of artifacts you think may be useful for reuse).

Answers not displayed.

An answer to this question is not required and 75 of 100 respondents chose not to answer.

52) Thank you for your time. Please provide your name and contact information if you would like to be notified of the results of this survey and/or you would like to be informed of the future activities of the Earth Science Data Systems Software Reuse Working Group. Your name and contact information will not be shared with or distributed to any other entities.

52a) Name (Optional):

Answers not displayed.

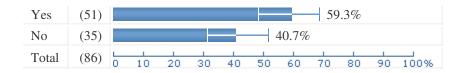
An answer to this question is not required and 50 of 100 respondents chose not to answer.

52b) Email (Optional):

Answers not displayed.

An answer to this question is not required and 47 of 100 respondents chose not to answer.

53) May our researcher contact you if we need to clarify any of your responses?



Confidence: +/-10.3%

An answer to this question is not required and 14 of 100 respondents chose not to answer.

Answers to this question are correlated with how respondents answered the following questions:

| Corre | lation | Quest | ion |
|-------|--------|-------|-----|
| | | | |

-0.31 Q6) Over the last five years, have you reused software development artifacts developed outside of

xxx) Your participation in this questionnaire is appreciated as it will enable the Working Group to better assess the reuse needs of the community and to propose solutions that can best fit those needs. Information collected in this questionnaire will not be used for any other purpose and will not be distributed to other entities without prior approval of the respondents. Results will be published in aggregate form only at http://softwarereuse.gsfc.nasa.gov.

We would truly appreciate it if you can forward the <u>URL of this survey</u> to other members of your organization who are involved in system architecture and/or influence decisions on selection of system components.

54) Feel free to use the space below to provide us with any information that you think is relevant to the Software Reuse Working Group goals, but was not covered in the survey questions.

Answers not displayed.

An answer to this question is not required and 82 of 100 respondents chose not to answer.

Questionnaire

Earth Science Software Reuse Questionnaire

This software reuse questionnaire is being conducted by the NASA Earth Science Data Systems Software Reuse Working Group to (1) learn about the Earth science community's needs for reusable software components (and other software development artifacts), (2) identify software artifacts that are already being reused within the community, and (3) identify existing patterns of software reuse.

Your participation in this survey is appreciated as it will help us to better understand the reuse needs of the Earth science community and to propose solutions that can best fit those needs. Such solutions will enable members of the community to more easily share, publish and locate reusable components of interest. By facilitating reuse within the Earth science community, the working group is seeking to help you reduce system development costs, gain greater visibility for your work within the community, and more efficiently share resources across projects.

On average, the questionnaire takes about 20 minutes to complete. In addition to submitting your own response, it would be valuable to the reuse working group if you can also forward the questionnaire to other members of your development team who are involved in system architecture and/or influence decisions on selection of system components.

The information collected here will only be used by the reuse working group for the purposes described above. Individual responses will not be distributed to other entities without prior approval from respondents. Results will only be published in aggregate form and will be made available at http://softwarereuse.nasa.gov/

The NASA Earth Science Data Systems Software Reuse Working Group is chartered to address technical issues required to enable and facilitate reuse of software assets within the Earth science community. The working group is comprised of part time support staff from NASA, Earth science mission projects, Earth science data providers and university researchers. More information about the activities of the working group can be found at http://softwarereuse.nasa.gov/. You can subscribe to our mailing list at here.

| | Background Information | |
|----|---|--|
| 1) | Which of the following best describes your main role in your project/software development process? (Select one) | |
| | C Principal Investigator | |
| | C Scientist | |
| | C Technical/Project Manager | |
| | C System Architect/Designer/Engineer | |
| | C Software Engineer/Developer | |
| | C Other | |
| | If Other, please specify: | |
| 2) | Which category best describes the type of your organization? (Select one) | |
| | C NASA | |
| | Other Government Agency | |
| | | |

| C University/Academia C Commercial Organiza C Other If Other or Other Government | | | |
|---|--|----------------------------|---|
| Which Operating System(development activities? (| (s) do you currently use or check all appropriate boxe | | for your system |
| ☐ Unix | | , | |
| ☐ Windows | | | |
| ☐ Macintosh | | | |
| ☐ Linux | | | |
| ☐ IBM Mainframes (e.g | . MVS, z/OS) | | |
| ☐ Other | | | |
| If Other, please specify: | | | |
| C C++ C# Java Perl Pascal Python Fortran Basic/Visual Basic | uage(s) do you currently u check all appropriate boxe nguages (PHP, JSP, etc.) | se or plan to use in the f | uture for your system |
| 5) Is your organization involved | d in activities that involve usin | g either of the following: | |
| | Not involved / Don't know | Considering it | Currently involved / Plan to start in the near future |
| Federal Enterprise Architecture | | | |
| СММІ | | | |
| | | | |

Recent Reuse Experiences

Definition of Reuse: Within the context of this survey, reuse is defined as the process of creating systems using software development artifacts from existing systems, rather than building everything from scratch. Most reuse involves software source code but other types of software development artifacts (such as design patterns, algorithms, and executable components) can also be reused.

6) Over the last five years, have you reused software development artifacts <u>developed outside of your project or group?</u>

| | C Yes | | | | | | |
|-------|--|---------------|-----------------------------------|------------------------------|------------------------------|------------------|--------------------------|
| | C No | | | | | | |
| Go to | question viii if question 6 is | Yes | | | | | |
| Go to | question vi if question 6 is | No | | | | | |
| | | Rec | ent Reuse | Experience | S | | |
| | ow important were the fortifacts developed outside | | | iting you fror | m reusing sof | tware develo | pment |
| | | | 1 (Not important at all) | 2 (Not very important) | 3 (Somewhat important) | 4 (Important) | 5 (Very important) |
| | a) I didn't know where to l reusable artifacts | ook for | 0 | 0 | 0 | 0 | 0 |
| | b) I didn't know that suital artifacts existed at the tim | | 0 | 0 | 0 | 0 | 0 |
| | c) I couldn't find anything compatible with my system | | 0 | 0 | 0 | 0 | 0 |
| | d) Available artifacts were or difficult to adapt to my | | 0 | 0 | 0 | 0 | 0 |
| | e) Available artifacts were understand or poorly docu | | 0 | 0 | 0 | 0 | 0 |
| | f) None of the available art matched my requirements | ifacts | 0 | 0 | 0 | 0 | 0 |
| | g) It was hard to overcome restrictions | e licensing | 0 | 0 | 0 | 0 | 0 |
| | h) I needed the source coo wasn't available | le and it | 0 | 0 | 0 | 0 | 0 |
| | i) I preferred to have the c take place within my proje the experience of developin needed capability | ct or wanted | o | 0 | 0 | 0 | 0 |
| | j) I didn't like how the other was designed/implemented | | 0 | 0 | 0 | 0 | 0 |
| | k) Other | | 0 | 0 | 0 | 0 | 0 |
| | Other, please specify what our group: | prevented you | ı from reusing | software deve | elopment artifa | cts developed | outside of |
| | | | | | | | |
| Go to | question xix if question 6 is | s No | | | | | |
| | | Rec | ent Reuse | Experience | S | | |
| | ver the last five years, ho evelopment artifacts? | ow often hav | e you (or you | ır project) re | used the follo | owing types (| of software |
| | | 1 (Never) | 2 (Rarely) | 3 (Sometir | mes) (Oft | | 5 v Often) |
| | a) Algorithms, Techniques | 0 | 0 | 0 | (| | 0 |
| | b) Designs, Architectures | 0 | 0 | 0 | | > | 0 |
| | c) Source code, Scripts | 0 | 0 | 0 | C |) | 0 |

| e) Other If Other, please specify years: Over the last five year software? | | | C re developme | <u> </u> | 0 | | 0 |
|---|--|---|---|--|-----------------|------------------|-----------------|
| Over the last five year software? | | es of softwar | re developm | | | | |
| software? | ers, how often | | | ent artifacts | s you have | reused in the | e last five |
| software? | irs, how often | | | | | | |
| a) Complete systems of | | have you (| or your pro | ject) reus | ed the foll | owing type | s of |
| a) Complete systems of | | 1 (Never) | 2 (Rarely) | | 3 etimes) | 4 (Often) | 5 (Very Ofte |
| applications | or | 0 | 0 | | 0 | 0 | c |
| b) Subsystems or com | iponents | 0 | 0 | | 0 | 0 | 0 |
| c) Code libraries | | 0 | 0 | | | 0 | 0 |
| d) Code fragments | | 0 | 0 | (| 0 | 0 | 0 |
| e) Other | | 0 | 0 | | 0 | 0 | 0 |
| | R | ecent Reu | use Exper | iences | | | |
| In your most recent so functionality was proveystems or services the | software deve | lopment ex of the follo | owing (this | pproxima | | | |
| | software deve | lopment ex of the follo | owing (this | pproxima | | | cludes |
| functionality was prov | software develovided by each chart your syste | lopment ex of the follo | operience, a pwing (this s with)? | ipproxima is for you | r system o | only and exc | cludes |
| functionality was prov systems or services th | software developided by each that your system | lopment ex of the follo | owing (this s with)? | ipproximatis for you | 5-15% | 15-50% | >50% |
| a) Existing software in | software developed by each that your system the baseline system software | lopment ex of the follo em interact: ystem | xperience, a cowing (this is with)? | epproximatis for you | 5-15% | 15-50% | >50% C |
| a) Existing software in b) Newly written custo c) Software reused from | software development of the baseline symmetry of another part | lopment ex of the follo em interact: ystem | None C | <5% C | 5-15% C | 15-50% C | >50% C |
| a) Existing software in b) Newly written custo c) Software reused from organization d) Software reused from organization | software developed by each that your system the baseline syom software om another part om another com the science com | lopment ex of the folicem interact: ystem | None C C | <5% C C | 5-15% C C | 15-50% C C | >50% |
| a) Existing software in b) Newly written custo c) Software reused from organization d) Software reused from organization in the Ear e) Software reused from organization in the Ear | software developed by each that your system the baseline system software om another part of another arth science comom outside the least system of the syste | lopment ex of the folicem interact: ystem | None C C | <pre>comproximate is for your </pre> <pre><5% C C C C C C C C C C C C C C C C C C C</pre> | 5-15% C C | 15-50% | >50% |

| ed expertise in rganization | 0 | 0 | 0 | | 0 | O |
|---|--|---|--|--|--|--|
| her | 0 | o_ | 0 | | 0 | 0 |
| | now you provided | the specified | percentage of | functionality in | your most rec | ent software |
| | Rec | ent Reuse | Experience | S | | |
| led *any* of the | capabilities nee | eded? If so, h | | | | |
| | | 1 (Not important at all) | 2 (Not very important) | 3 (Somewhat important) | 4 (Important) | 5 (Very important) |
| | software existed | 0 | 0 | 0 | 0 | 0 |
| | n't compatible | 0 | 0 | 0 | 0 | O |
| | t exactly match | c | 0 | 0 | 0 | O |
| | | 0 | 0 | 0 | 0 | 0 |
| | | 0 | 0 | 0 | 0 | 0 |
| | ome licensing | 0 | 0 | 0 | 0 | 0 |
| | code and it | 0 | 0 | 0 | 0 | 0 |
| lopment take place ect or wanted the e | e within my experience of | o | 0 | o | o | c |
| | | O | 0 | 0 | 0 | 0 |
| her | | 0 | 0 | 0 | 0 | 0 |
| | didn't know other set ime ther software was my system her software was retained or poorly definitions and the source of tavailable or eferred to have to loping the needed idn't like how the designed/impleme | Record of the newly written software led *any* of the capabilities need time there software wasn't compatible my system her software wasn't compatible my system her software was difficult to retain or poorly documented there software was too complex or cult to adapt to my needs was hard to overcome licensing dictions to meeded the source code and it it available to referred to have the lopment take place within my cot or wanted the experience of loping the needed capability idn't like how the other software designed/implemented | Recent Reuse By of the newly written software, was there alled *any* of the capabilities needed? If so, inting you from reusing that software? I (Not important at all) I didn't know other software existed the time There software wasn't compatible my system There software wasn't compatible my system There software was difficult to restand or poorly documented there software was too complex or cult to adapt to my needs There software was too complex or cult to adapt to my needs There software was too complex or cult to adapt to my needs There software was too complex or cult to adapt to my needs There software was too complex or cult to adapt to my needs There software was too complex or cult to adapt to my needs There software was too complex or cult to adapt to my needs There software was too complex or cult to adapt to my needs There software was too complex or cult to adapt to my needs There software was too complex or cult to adapt to my needs There software was too complex or cult to adapt to my needs There software was too complex or cult to adapt to my needs There software was too complex or cult to adapt to my needs There software was too complex or cult to adapt to my needs There software was too complex or cult to adapt to my needs There software was too complex or cult to adapt to my needs There software was too complex or cult to adapt to my needs There software was too complex or cult to adapt to my needs There software was too complex or cult to adapt to my needs There software existed to my needs There software e | Recent Reuse Experience The project: Recent Reuse Experience The project is a software, was there software from led *any* of the capabilities needed? If so, how important at all) In (Not very important at all) In (Not very important) In (Not very important) | Recent Reuse Experiences The software of the capabilities needed? If so, how important were the formating you from reusing that software? The software wasn't compatible of the software wasn't compatible of the software didn't exactly match equirements The software was difficult to restand or poorly documented the software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was too complex or was hard to overcome licensing ictions The software was hard to overcome licensing ictions The software was hard t | Recent Reuse Experiences The project: Recent Reuse Experiences The project is a project in the project in th |

| | | Recent Reuse Experiences | |
|-----|----------------------------------|---|---|
| 19) | | Group is very interested in identifying some of the artifacts ne community. Please help us by listing a few of the artifac years. | |
| | Name of Artifact: | | |
| | Source Organization of Artifact: | | |
| | Reference or URL of Artifact: | | |
| 20) | Another Artifact? | | |
| | C Yes | | |
| | O No | | |
| | O NO | | |
| | | Recent Reuse Experiences | |
| 21) | Any information about this art | ifact will be appreciated. | _ |
| | Name of Artifact: | | |
| | Source Organization of Artifact: | | |
| | Reference or URL of Artifact: | | |
| 22) | Another Artifact? | | |
| | O Yes | | |
| | O No | | |
| | | | |
| | | Recent Reuse Experiences | |
| 23) | Any information about this art | ifact will be appreciated. | |
| , | Name of Artifact: | | |
| | Source Organization of Artifact: | | |
| | Reference or URL of Artifact: | | |
| | | | ļ |
| 24) | Another Artifact? | | |
| | C Yes | | |
| | C No | | |
| | | | |
| | | Recent Reuse Experiences | |
| 25) | Any information about this art | ifact will be appreciated. | |
| | Name of Artifact: | | |
| | Source Organization of Artifact: | | |
| | Reference or URL of Artifact: | | |
| 26) | Another Artifact? | | |
| | C Yes | | |
| | C No | | |
| | | | |
| | | Recent Reuse Experiences | |

|) Any information about this | | | | | |
|---|---|---|---|----------------------------------|---|
| Name of Artifact: | | | | | |
| Source Organization of Artifact Reference or URL of Artifact: | t: | | | | |
| | Recent | Reuse Exper | iences | | |
|) How effective were the following | owing in helpin | g you locate a | nd acquire soft | ware developme | ent artifacts? |
| | 1 (Not important at all) | 2 (Not very important) | 3 (Somewhat important) | 4 (Important) | 5 (Very important) |
| a) Personal knowledge from past projects | 0 | 0 | 0 | 0 | 0 |
| b) Word of mouth/networking | 0 | 0 | 0 | 0 | 0 |
| c) Google search or similar | 0 | 0 | 0 | 0 | 0 |
| d) Serendipity | 0 | 0 | 0 | 0 | 0 |
| e) Reuse catalog or repository | 0 | 0 | 0 | 0 | 0 |
|) When evaluating software | development ai | Reuse Exper | | ant are the follo | wing factors |
|) When evaluating software in influencing your decision | Recent development and to reuse an ar | Reuse Experrifacts for reustifact? | se, how importa | 4 | 5 (Very |
|) When evaluating software in influencing your decision | Recent development and to reuse an ar | Reuse Experrifacts for reustifact? | se, how importa | | 5 |
|) When evaluating software in influencing your decision a) Knowledge of author | Recent development and to reuse an are (Not important at all) | Reuse Experitifacts for reuse tifact? 2 (Not very important) | 3 (Somewhat important) | 4 (Important) | 5 (Very important) |
| a) Knowledge of author b) Testing/certification | Recent development and to reuse an are (Not important at all) | Reuse Experrifacts for reustifact? 2 (Not very important) | 3 (Somewhat important) | 4 (Important) | 5 (Very important) |
| a) Knowledge of author | Recent development and to reuse an are (Not important at all) C C | Reuse Experitifacts for reuse tifact? 2 (Not very important) C C C | 3 (Somewhat important) C C | 4 (Important) C C C | 5 (Very important) C C |
| a) Knowledge of author b) Testing/certification c) Recommendation from colleague d) Standards compliance | Recent development and to reuse an are (Not important at all) C | Reuse Experitifacts for reuse tifact? 2 (Not very important) C C | 3 (Somewhat important) | 4 (Important) | 5 (Very important) |
| a) Knowledge of author b) Testing/certification c) Recommendation from colleague | Recent development and to reuse an are (Not important at all) C C | Reuse Experitifacts for reuse tifact? 2 (Not very important) C C C | 3 (Somewhat important) C C | 4 (Important) C C C | 5 (Very important) C C |
| a) Knowledge of author b) Testing/certification c) Recommendation from colleague d) Standards compliance e) Availability of source | Recent development and to reuse an are (Not important at all) C C C | Reuse Experitifacts for reuse tifact? 2 (Not very important) C C C | 3 (Somewhat important) C C C | 4 (Important) C C C | 5 (Very important) C C |
| a) Knowledge of author b) Testing/certification c) Recommendation from colleague d) Standards compliance e) Availability of source code | Recent development and to reuse an are (Not important at all) C C C C | Reuse Experitifacts for reustifact? 2 (Not very important) C C C C | 3 (Somewhat important) C C C C | 4 (Important) C C C C | 5 (Very important) C C C C |
| a) Knowledge of author b) Testing/certification c) Recommendation from colleague d) Standards compliance e) Availability of source code f) Quality of documentation g) Availability of | Recent development and to reuse an arr (Not important at all) C C C C C | Reuse Experitifacts for reuse tifact? 2 (Not very important) C C C C C C | 3 (Somewhat important) C C C C C C | 4 (Important) C C C C C C | 5 (Very important) C C C C C C |
| a) Knowledge of author b) Testing/certification c) Recommendation from colleague d) Standards compliance e) Availability of source code f) Quality of documentation g) Availability of support/maintenance h) Low dependency on | Recent development and to reuse an arr (Not important at all) C C C C C C | Reuse Experitifacts for reuse tifacts? 2 (Not very important) C C C C C C C C C C C C C C C C C C | 3 (Somewhat important) C C C C C C C | 4 (Important) O O O O O O | 5 (Very important) O O O O O O O |
| a) Knowledge of author b) Testing/certification c) Recommendation from colleague d) Standards compliance e) Availability of source code f) Quality of documentation g) Availability of support/maintenance h) Low dependency on other artifacts i) Ease of | Recent development and to reuse an area (Not important at all) C C C C C C C C C C C C C C C C C C | Reuse Experitifacts for reuse tifacts? 2 (Not very important) C C C C C C C C C C C C C C C C C C C | se, how importa | 4 (Important) O O O O O O O O | 5 (Very important) C C C C C C C C C |
| a) Knowledge of author b) Testing/certification c) Recommendation from colleague d) Standards compliance e) Availability of source code f) Quality of documentation g) Availability of support/maintenance h) Low dependency on other artifacts i) Ease of adaptation/integration j) Cost of creating/acquiring | Recent development and to reuse an area (Not important at all) C C C C C C C C C C C C C | Reuse Experitifacts for reuse tifacts? 2 (Not very important) C C C C C C C C C C C C C C C C C C | Se, how importations of the control | 4 (Important) O O O O O O O O O | 5 (Very important) O O O O O O O O O O O |

| 31) | If other, please specify a | iny other factors | that have ir | nfluenced your | decision to use | an artifact in | the past: |
|------------------|--|------------------------|--------------|---------------------------|------------------|----------------|----------------------|
| | | | | | | | |
| | | Dos | ant Daw | aa Eynasias | | | |
| | | кес | cent Keus | se Experien | ces | | |
| 32) | For software developr | nent artifacts tl | hat you've | reused in the | e last five year | rs, how ofter | n have you |
| | | (| 1 Never) | 2 (Rarely) | 3 (Sometimes) | 4 (Often) | 5 (Very Often) |
| | a) Modified the artifact | s? | 0 | 0 | 0 | 0 | 0 |
| | b) Communicated the object to the original desortion of those artifacts | | 0 | o | 0 | 0 | o |
| | Now thinking about lid ast five years, how of | | se: for soft | tware develo _l | oment artifact | s that you'v | e reused in the |
| | | | 1 (Never) | 2 (Rarely) | 3 (Sometimes | 4 (Often) | 5 (Very Often) |
| | a) Used open source so | oftware? | 0 | 0 | 0 | 0 | 0 |
| | b) Used a shareware/p software? | ublic domain | 0 | 0 | 0 | 0 | 0 |
| | c) Used a formal licens with the artifact develo | | 0 | 0 | 0 | 0 | 0 |
| | d) Used a semi-formal (e.g. Memorandum of with the artifact develo | Understanding) | 0 | 0 | 0 | 0 | 0 |
| | e) Reused the artifacts formal license? | without a | 0 | 0 | 0 | 0 | 0 |
| <i>part,</i> 34) | nition of Reusability: Fin new systems. Over the last five year | s, have you ma | ability of a | | , | · | |
| I | people outside of you | r project or gro | up? | | | | |
| | C Yes | | | | | | |
| | C No | | | | | | |
| Go to | question xxii if question | n 34 is No | | | | | |
| Go to | question xxiv if questio | n 34 is Yes | | | | | |
| | | | Reus | sability | | | |
| | | | | | | | |
| | How important were t artifacts available for | | ctors in pr | eventing you | from making | your softwa | re development |
| | | 1 | 2 | | 3 | 4 | 5 |
| | | (Not important at all) | (Not vo | | | 4 mportant) | (Very important) |
| | a) Not knowing how | 0 | 0 | | 0 | 0 | 0 |

| | b) Cost of developing for reuse | 0 | C | , | 0 | 0 | | 0 |
|-------|---|--|--|--|--|---|--|--|
| | c) Not knowing if it will be useful | 0 | | , | 0 | 0 | | 0 |
| | d) Your organization's software release policy limitations | 0 | c | , | 0 | c | | o |
| | e) Support and maintenance | 0 | 0 | , | 0 | 0 | | 0 |
| | f) No standard way for distribution | 0 | C | , | 0 | 0 | | 0 |
| | g) Concern over losing competitive advantage | 0 | C | , | 0 | 0 | | О |
| | h) Concern over losing intellectual property | 0 | c | , | 0 | 0 | | 0 |
| | i) Other | 0 | 0 |) | 0 | 0 | | 0 |
| GO TO | question xxviii if questi | 011 34 IS INO | | | | | | |
| | | | Reı | usability | | | | |
| | How often have you b | | lowing types (| of software de | evelopmen | it artifacts ii | n a way tha | at they |
| | How often have you b can be more readily re | eused outsi | lowing types o | of software do | 3 | 4 | 5 | |
| | a) Algorithms, | eused outsi | lowing types of ide of your production of the lower of th | of software do | | | - | |
| | can be more readily re | 1 (Ne | lowing types of ide of your pro | of software do oject? | 3 metimes) | 4 (Often) | 5 (Very Of | |
| | a) Algorithms, Techniques | 1 (Ne | lowing types of ide of your production (Ra | of software dopject? 2 arely) (Sor | 3 metimes) | 4 (Often) | 5 (Very Of | |
| | a) Algorithms, Techniques b) Designs, Architectur | 1 (Ner | lowing types of ide of your production (Radio) | of software depict? 2 arely) (Sor | 3 metimes) | 4 (Often) C | (Very Of | |
| | a) Algorithms, Techniques b) Designs, Architectur c) Source code, Scripts | 1 (Ner | lowing types of ide of your production (Radio) | of software depict? 2 (Sor | 3 metimes) O O | 4 (Often) C | (Very Of | |
| 38) | a) Algorithms, Techniques b) Designs, Architectur c) Source code, Scripts d) Executables, Binarie | res (case descriptions) | lowing types of ide of your production (Radio) | of software depict? 2 arely) (Sor | 3 metimes) O O O O | 4 (Often) O O O | (Very Of | ften) |
| 38) | a) Algorithms, Techniques b) Designs, Architectur c) Source code, Scripts d) Executables, Binarie e) Other | res (case outsing) what other the of your processory of the service of the servi | lowing types of ide of your products. | of software debject? 2 (Sort C) C) C) C) C) C) C) C) Cre development | 3 metimes) O O O O O artifacts year | 4 (Often) C C C C C cou have built | (Very Of O | ften) |
| 38) | a) Algorithms, Techniques b) Designs, Architectur c) Source code, Scripts d) Executables, Binarie e) Other If Other, please specify be readily reused outside How often have you design. | res (case des des des des des des des des des d | lowing types of ide of your products. | of software debject? 2 (Sort C) C) C) C) C) C) C) C) Cre development | 3 metimes) O O O O O artifacts year | 4 (Often) C C C C C C D D D D D D D D D D D D D | (Very Of O O O O O O O O O O O O O O O O O O | ften) |
| 38) | a) Algorithms, Techniques b) Designs, Architectur c) Source code, Scripts d) Executables, Binarie e) Other If Other, please specify be readily reused outside How often have you design. | res (what other to e of your procested for project? | lowing types of ide of your project: (Rad) (Rad | of software dopiect? 2 arely) (Sortion C) C C C C C ce development ypes of software 2 | 3 metimes) O O O O c artifacts yeare in a w | 4 (Often) C C C C C C D D D D D D D D D D D D D | (Very Of C) C) C) C) C) in a way that | at they can |
| 38) | a) Algorithms, Techniques b) Designs, Architectur c) Source code, Scripts d) Executables, Binarie e) Other If Other, please specify be readily reused outside How often have you dreused outside of you a) Complete solutions | res (what other tree of your project? | lowing types of ide of your product of your product of your product of the following to the | of software dopject? 2 arely) (Sort C) C C C C C C The development of software development of softwar | 3 metimes) O O O O artifacts your rare in a w | 4 (Often) C C C C C D D D D D D D D D D D D D D | (Very Of O O O O O O O O O O O O O O O O O O | at they can ore readily 5 ery Often) |
| 38) | a) Algorithms, Techniques b) Designs, Architectur c) Source code, Scripts d) Executables, Binarie e) Other If Other, please specify be readily reused outside How often have you dreused outside of you a) Complete solutions applications | res (what other tree of your project? | lowing types of ide of your product of your product of your product of the following to the | of software dopiect? 2 arely) (Sort C) C C C C C C C C C C C C C C C C C C | 3 metimes) O O O O artifacts your rare in a w (Sometimes) | 4 (Often) C C C C C D D D D D D D D D D D D D D | (Very Of O O O O O O O O O O O O O O O O O O | at they can ore readily 5 ery Often) |

| e) Other | | 0 0 | 0 0 | 0 | 0 |
|---|---------------------|----------------------|--------------------|---------------------|----------------|
| If Other, please specify | what other types o | of software you h | ave developed in a | way that they car | n be readily |
| reused outside of your | oroject: | | | | |
| | | | | | |
| | | | | | |
| | | Reusabili | ty | | |
| | | | | | |
| | | | | | |
| How important were | the following fac | tors in preventi | ng you from ma | king your artifact | ts available 1 |
| reuse? | | | | | |
| | 1 (Not important | 2 (Not you) | 3 (Somewhat | 4 | 5 (Very |
| | at all) | (Not very important) | important) | (Important) | important |
| a) Not knowing how | 0 | 0 | 0 | 0 | 0 |
| b) Cost of | 0 | 0 | 0 | 0 | 0 |
| developing for reuse | 0 | | | · | |
| c) Not knowing if it will be useful | 0 | o | 0 | 0 | 0 |
| d) Your organization's software release policy limitations | o | О | 0 | o | 0 |
| e) Support and maintenance | o | o | 0 | o | 0 |
| f) No standard way for distribution | О | c | 0 | С | 0 |
| g) Concern over losing competitive advantage | o | o | 0 | 0 | c |
| h) Concern over losing intellectual property | 0 | 0 | 0 | 0 | O |
| i) Other | 0 | 0 | 0 | 0 | 0 |
| If Other, please specify reuse: | any other factors t | hat have prevent | ed you from maki | ng your artifacts a | vailable for |
| | | Reusabili | ty | | |
| | | | | | |
| | | | | | |
| To your knowledge, he reused by others? | now often are the | software deve | opment artifacts | s produced by yo | ur project |
| C 1 (Never) C | 2 (Rarely) | 3 (Sometimes) | C 4 (Often) | C 5 (Very Ofte | n) |
| _ , , | . , , | , | _ , , | _ , , | • |
| The Software Reuse V successfully reused v reusable artifacts that | vithin the Earth s | cience commun | ity. Please help | | |
| Name of Artifact: | | | | | |
| Reference or URL of Art | | | | | |

| 15) Another Artifact? | | | | | | | |
|---|--------------------------------|--------------------------------------|------------------------------|---------------|-----------|---------------------------|--|
| O Yes O No | | | | | | | |
| , No | | | | | | | |
| | | Reusabili | ty | | | | |
| | | | | | | | |
| Any information abou Name of Artifact: | it this artifact w | пі ве арргесіате | a. | | | | |
| Reference or URL of Art | ifact: | | | | | | |
| Reference of ORE of Art | | | | | | | |
| | | Community N | Needs | | | | |
| 7) In your opinion, how within Earth science | | d the following f | actors be in help | oing increa | se the | level of reus | |
| | 1 (Not important at all) | 2 (Not very important) | 3 (Somewhat important) | 4 (Importa | ant) | 5 (Very Important) | |
| a) Standardized license agreement for the Earth science community | o | 0 | 0 | o | | 0 | |
| b) Use of open source licensing | 0 | 0 | 0 | o | | 0 | |
| c) An Earth science catalog/repository for reusable artifacts | 0 | 0 | 0 | o | | 0 | |
| d) Standardized support policy for reused software | 0 | o | 0 | 0 | | 0 | |
| e) Changes to NASA external release policy | 0 | 0 | 0 | c | | 0 | |
| f) Education/guidance on reuse | 0 | o | 0 | c | | O | |
| g) Other | 0 | 0 | 0 | 0 | | 0 | |
| 28) If Other, please specify the Earth science comm | what other factor | | | | e level (| | |
| | | Community N | Needs | | | | |
| 9) Which of the following | g are you consi | dering as part of | your future soft | ware deve | lopmer | nt efforts? | |
| | | 1 (Don't know/No planning to use) | | ing using) | 3 (Alre | eady using/Pla to use) | |
| a) Web services | | 0 0 | | | | 0 | |
| b) Component-based | architectures | 0 | 0 | 0 | | 0 | |
| c) Commercial compo | nents | 0 | 0 | | | 0 | |
| d) Grid services | | 0 | 0 | | | 0 | |

 \circ

g) Other

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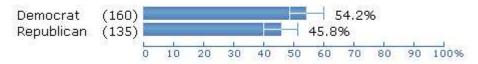
| 51) | Which reusable artifacts would you use if those were made available? (feel free to specify specific artifacts that you would like to reuse, or types of artifacts you think may be useful for reuse). |
|-----------------------------------|---|
| 52) | Thank you for your time. Please provide your name and contact information if you would like to be notified of the results of this survey and/or you would like to be informed of the future activities of the Earth Science Data Systems Software Reuse Working Group. Your name and contact information will not be shared with or distributed to any other entities. |
| | Name (Optional): Email (Optional): |
| 53) | May our researcher contact you if we need to clarify any of your responses? |
| | C Yes |
| | C No |
| asso Info dist agg We | r participation in this questionnaire is appreciated as it will enable the Working Group to better ess the reuse needs of the community and to propose solutions that can best fit those needs. Or mation collected in this questionnaire will not be used for any other purpose and will not be cributed to other entities without prior approval of the respondents. Results will be published in regate form only at http://softwarereuse.gsfc.nasa.gov . would truly appreciate it if you can forward the URL of this survey to other members of your anization who are involved in system architecture and/or influence decisions on selection of system |
| com | reponents. Feel free to use the space below to provide us with any information that you think is relevant to the Software Reuse Working Group goals, but was not covered in the survey questions. |

Notes

Bar Graph Confidence Intervals:

The bar graphs presented in the Results Analysis section include 95% confidence intervals to illustrate the degree of precision available in your results. For example, in the following graph 54.2% (160/295) of the respondents indicated they will vote Democrat vs. 45.8% (135/295) Republican.

How will you vote in the upcoming election?



However, because the survey is based on the results of only 295 respondents, the actual percent of people who will vote Democrat could be somewhat higher or lower than 54.2%. Confidence intervals tell you how much higher or lower the percent could be. The I-bar show and the tip of each bar illustrates the spread between the lowest and highest value you are likely to see if you were to survey the entire population. In the example above, you can be 95% certain that the actual percent of people who will vote Democrat will be between 48% and 60%. Furthermore, somewhere between 40% and 52% of people will vote Republican. As you increase the number of respondents the range of uncertainty shrinks.

Confidence:

Each bar graph group is followed by the text "Confidence:" and a percentage. This number is the largest confidence interval found on any of the bars in the group and can be used as a summary measure of precision. The more precise, non-symmetrical confidence intervals are illustrated separately on each bar.

Average Score:

Some bar graph groups are followed by the text "Average Score:" and a number that represents the weighted average of all options chosen by the respondents. For example, if you asked respondents to rate their satisfaction on a scale including *Very satisfied*, *Satisfied*, *Neutral*, *Dissatisfied*, and *Very dissatisfied* and half responded *Very satisfied* and half responded *Satisfied*, the average score would be 1.5--half chose the first option (score=1) and half chose the second option (score=2), so the average score is 1.5.

Correlation:

The answers to two questions are correlated when they tend to move together. For example, if you ask respondents to rate their overall satisfaction with your company and also ask if they are likely to

purchase from your company again, the answers to these questions will probably show a strong correlation. That is, when satisfaction is high, the likelihood of repeat purchase is high. This is a positive correlation. Some question pairs have negative correlation. For example, the time a person spends on hold when calling for support usually has a negative correlation with overall satisfaction. Correlation is presented as a number from -1 to 1 where -1 is perfect negative correlation, 0 is no correlation, and 1 is perfect positive correlation.

When a statistically significant correlation between the answers of any two questions is found the report will include a note highlighting the correlation. This information can be used to gain insight into what factors drive key measures such as overall satisfaction.

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